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Field Guidebook: The Clarence Stream Gold Deposit, Southwestern New Brunswick

Kathleen G. Thorne[1], Don Hoy[2], and David R. Lentz[1]

[1] Department of Geology, University of New Brunswick, P.O. Box 4400, 2 Bailey Drive, Fredericton, New Brunswick, CANADA E3B 5A3
[2] Freewest Resources Canada Inc., 855 Field Street, Thunder Bay, Ontario, CANADA P7B 6B6

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FIELD GUIDEBOOK: THE CLARENCE STREAM GOLD DEPOSIT, SOUTHWESTERN NEW BRUNSWICK

INTRODUCTION

The Clarence Stream gold deposit is situated on the northwestern fringe of the Saint George Batholith in southwestern New Brunswick. Gold is hosted within numerous sheeted quartz veins that occupy northeast-trending brittle to ductile shear zones paralleling the intrusive contact with the batholith (Thorne *et al.* 2001). The host rocks surrounding these veins also contain disseminated gold within sheared and altered metagabbro and metasedimentary rocks that lie within the thermal aureole of the nearby Magaguadavic Granodiorite.

Recently, Lang *et al.* (2000) and Thompson and Newberry (2000) have proposed an intrusion-related genetic model to explain the existence of numerous gold deposits within the Tintina Belt (Yukon and Alaska). Their model seems to be an applicable tool for exploration on the Clarence Stream property because of the narrow time range for mineralization, which appears to coincide with local pluton emplacement. Ascertaining the spatial and temporal relationship of the various intrusions in the region to the gold mineralization and deformation is the principle focus of research being conducted at the University of New Brunswick with the financial support of Freewest Resources Canada Inc. and the Natural Sciences and Engineering Research Council of Canada.

The local geology and styles of mineralization will be observed in four of the twenty-nine trenches that have been excavated on the property by Freewest Resources Canada Incorporated. The last stop in the first portion of the field trip will be to observe the Magaguadavic Granodiorite that may be directly or indirectly responsible for the genesis of the mineralization. The latter portion of the field trip will entail the examination of drill core that is currently being stored at the Mount Pleasant mine site. Excerpts from Thorne and Lentz (2001) form the basis of this field guide hereafter.

HISTORY OF DISCOVERY AND EXPLORATION

Prospecting by Reg Cox Jr. in the Clarence Stream area was initiated subsequent to the release of results obtained from a regional stream-sediment water survey conducted by the Geological Survey of Canada in 1992. Numerous anomalous zones with respect to gold were delineated in the vicinity of the deposit. Quartz vein boulders containing significant gold values were found by Mr. Cox who in turn proceeded to option the property to Freewest Resources Canada Incorporated. Prospecting by the company uncovered additional mineralized float and outcrop over a 2 km strike length. In order to better explore and understand the area, they cut a 2.5 km grid over the favourably mineralized zone and immediately began a B-horizon soil sampling survey, as well as induced polarization and total field magnetic surveys. In August 2000, Freewest extended the original grid to the east, west and northwest, and it now spans 6.5 km of the claim block that consists of more than 500 claims to date. The results of the initial soil survey provided two distinctive anomalous zones referred to as the West Zone and the East Zone. Although there are numerous small anomalous zones that are scattered across the original

grid, much of the exploration activities to date have been focused within the vicinity of these two most prominent anomalies.

Geological mapping and sampling of the original grid concurrent with trenching of the soil anomalies were performed during the summer of 2000, which succeeded at uncovering numerous heavily altered and mineralized zones, as well as gold-bearing quartz veins up to 3 m wide. In January 2001, a 3474 m diamond-drilling program began where they intersected 21 m averaging 15.06 g/t Au at a depth of 60 m (Robertson 2001) on the eastern portion of the property. A second phase of drilling targeted at outlining the central zone commenced in June, 2001, which continued to produce spectacular grades. They include 12.5 m averaging 6.64 g/t Au, 7.21 g/t Au over a width of 12 m, 14.9 m of 7.8 g/t Au, and 9.5 m of 21.51 g/t Au (Robertson 2001).

Additional B-horizon soil sampling was undertaken during the summer of 2001 on the grid extensions to the west and north of the original grid. A rather large anomaly that spans intermittently from the most northern portion of the grid towards the southern boundary outlines another favourable zone that will be the focus of future exploration activity. Magnetic and induced polarization geophysical surveys are ongoing at this point and are expected to delineate numerous exploration targets. Plans for future exploration by the company include trenching of additional targets outlined on the grid extensions to the north and west of the original grid followed by additional diamond drilling to test the zones of greater potential and explore the area between the East and West zones.

GEOLOGIC SETTING

Multiple bimodal intrusive phases comprise the Late Silurian to Late Devonian Saint George Batholith that stitches together two major tectonic terranes; namely the St. Croix and Fredericton belts belonging to the Gander Terrane and the Mascarene-Nerepis Belt of the Avalon Terrane, respectively (Fyffe and Fricker 1987). The Ordovician clastic sedimentary rocks (Cookson Group) that predominantly comprise the St. Croix Belt show evidence of being deposited as a continental slope sedimentary sequence in a region of thinned continental crust (*Ruitenberg et al.* 1990) whereas Silurian wacke deposited by turbidity currents are typical of the Fredericton Belt. Siluro-Devonian volcanic rocks of the Mascarene-Nerepis Belt are situated southeast of the northeast-trending Sawyer Brook Fault (Whalen *et al.* 1996), which juxtaposes the Ordovician and Siluro-Devonian rocks in the area (Fyffe *et al.* 1999).

The exact boundary between the two terranes is obscured by the Mascarene-Nerepis Belt of the Avalon Terrane (including the Silurian Oak Bay and Waweig formations) that unconformably overlies the Cookson Group of the Gander Terrane (Fyffe and Fricker 1987), components of which include Ordovician rocks of the Kendall Mountain, Calais, and Woodland formations (Fyffe *et al.* 1999). Evidence suggests that these two terranes accreted during the mid-Paleozoic and are followed by major transcurrent movements (transpressional and transtensional) during the Appalachian Orogeny (Williams and Hatcher 1982).

The Saint George Batholith (see Figure 1) is one of numerous intrusions that lie within the Avalon Terrane, situated between the Falls Brook-Taylor Brook Fault and the Kennebacasis Fault (Fyffe and Fricker 1987). Cherry (1976) describes the batholith as a large post-Acadian

intrusion that consists of minor mafic to felsic intrusions whose emplacement is structurally controlled. A strong tectonic control on the emplacement of the is evident by their overall northeast-southwest trend (Ruitenberg *et al.* 1990). Underplating due to transpressional movement along the terrane boundaries may have initiated crustal melting during the Acadian Orogeny, generating this large composite intrusion (Whalen *et al.* 1994).

Due to the differing degrees of country rock assimilation by these intrusions, it is rather difficult to classify them using the I and S classification scheme of Chappell and White (1974). Rather, McLeod (1990) has informally classified the majority of these intrusions as A-type (anorogenic) with one of the exceptions being the I-type, calc-alkaline, magnetite-bearing Magaguadavic Granodiorite. The country rocks proximal to these intrusions have been subjected to hornfelsing and hydrothermal alteration events that overprint earlier features imposed upon them during the Acadian Orogeny.

Studies performed by Whalen *et al.* (1996) on the intrusions in the vicinity of the Gander-Avalon boundary demonstrate that they are not distinctly derived from one zone or the other, but are instead a combination of the two. Whalen *et al.* (1996) proposed a number of theories to explain this. These include the possibility that the contact between the two terranes is a series of faults as opposed to one major fault. The boundary may also be inclined, which would allow country rocks of one boundary to be assimilated into the magmas and thus contaminating the original source geochemical signatures. However, the most widely accepted theory supported by geophysical surveys suggests that the basement underlying both terranes possesses a unique composition when compared to either the Gander and Avalon lithologies (Whalen *et al.* 1996).

Ruitenberg (1967) carried out much of the structural and stratigraphic interpretation for the Rollingdam area. He recognized a northeast-trending structure whose interior consisted of Ordovician pelitic metasediments flanked on either side by Silurian clastic sedimentary rocks, which he referred to as the St. David Dome. The generation of this antiformal structure as well as the subsequent three phases of deformation are thought to have been a result of the Acadian Orogeny. The latest phase (tensional regime) may have been the result of subsidence in the area (Ruitenberg 1967).

Development of this domal feature was attributed to compressional north-northwest–south-southeast stresses during the F_1 phase of deformation (Ruitenberg 1967). Minor folds gently dip to the east-northeast and west-southwest, which have a well-developed steeply dipping slatey cleavage striking east-northeast, parallel to the axial planes of the F_1 folds (Ruitenberg 1967). S_1 is seen to cut the bedding planes at a high angle and is defined by fine white mica and occasional flattening of quartz grains (Ruitenberg 1967).

The second phase of deformation (F_2) also took place under compressional stresses similar to those that were active during the first phase of deformation, although F_2 deforms the bedding as well as the slatey cleavage (Ruitenberg 1967). The F_2 folds are normally found to plunge gently east-northeast. Ruitenberg (1967) was able to constrain an approximate age of the second phase of deformation by observing coarse biotite crystals that defined S_2 in the schists immediately adjacent to the Tower Hill pluton suggesting that these crystals were formed during the same compressional stresses that generated the F_2 folds.

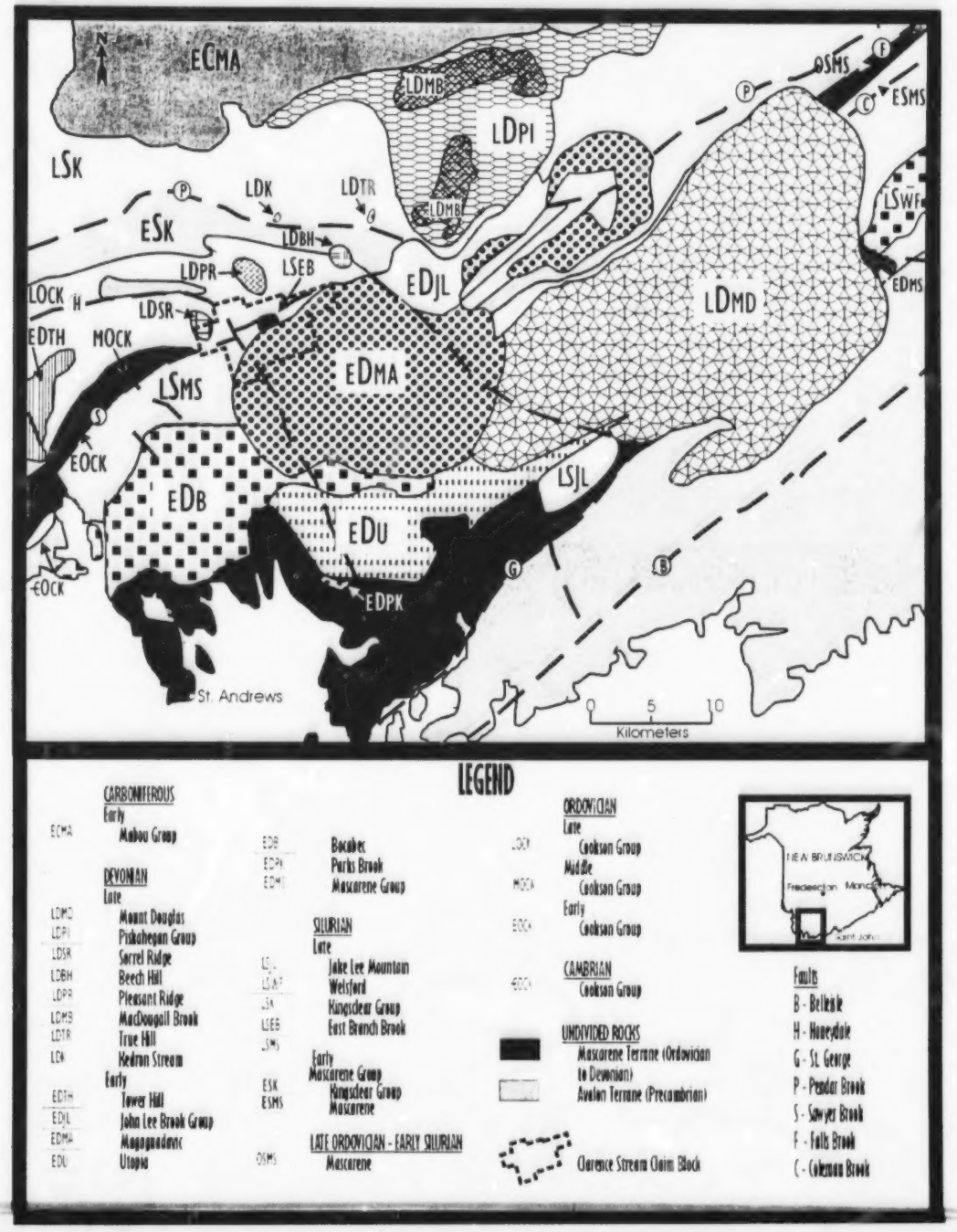

Figure 1. Regional geology map illustrating the location of the Clarence Stream claim block in relation to the Saint George Batholith, southwestern New Brunswick. The geology was compiled from maps generated by McLeod (1990) and New Brunswick Department of Natural Resources and Energy (2000) (modified after Hoy 2000).

F_3 folds described by Ruitenberg (1967), generally plunge steeply to the northeast-southwest or northwest-southeast while the S_3 steeply dipping cleavage strikes in the range of northeast to northwest. They are described by Ruitenberg (1967) as kink folds that vary from tight to open depending primarily on the composition of the hosting lithology. Ruitenberg (1967) concluded that F_3 folding occurred before or during magmatic activity in the area due to the presence of a preserved F_3 folded metasedimentary inclusion in the Tower Hill pluton. The latest episode of deformation (F_4) is generated by tensional stresses presumed to be oriented north-northwest–south-southeast with folds gently plunging to the east-northeast–west-northwest (Ruitenberg 1967).

Overall, an extensive variety of mineralized zones are common in the vicinity of the Saint George Batholith and surrounding intrusions. They include tin-tungsten-molybdenum-bismuth formerly produced at the Mount Pleasant mine; nickel deposits within the St. Stephen gabbro; and, gold in various locales within quartz veins situated in close proximity to granitic plutons. Ruitenberg *et al.* (1990) proposed that these gold occurrences may be a result of remobilization from deeper in the crust during metamorphic dehydration, possibly combined with mantle heat and/or fluid inputs.

LOCAL GEOLOGY AND STRUCTURE

Metasedimentary units that range in age from Ordovician to Silurian are the host rocks to the plutons in the vicinity of the Clarence Stream property. Hornfelsing of these units is expressed by the presence of a cordierite-muscovite-biotite metamorphic assemblage, which may have been generated as a consequence of heat production from the emplacement of the nearby intermediate intrusion or by the more widespread mafic intrusions found throughout the property.

Skirting the southern boundary of the claim block is the Magaguadavic Granodiorite. Minimal exposures of this megacrystic intrusion have made it necessary to rely heavily on geophysical data to map its existence and make assumptions concerning its relationship to the surrounding country rocks. Mafic intrusions that are both concordant and discordant to the local bedding appear to have originally been sills that have undergone episodic deformation and metamorphism. The age of these metagabbroic bodies relative to the felsic intrusion is not yet known. However, geochemical investigations by the first author have shown that these mafic intrusions are similar to the Late Silurian to Early Devonian (403 Ma, whole rock Rb-Sr) Bocabec Gabbro (Currie 1988), which is older than the Magaguadavic Granodiorite (400 ± 4 Ma, $^{40}Ar/^{39}Ar$ biotite (McLeod 1990); 396±1 Ma, U-Pb zircon (Bevier 1990)).

The units on the property consistently trend northeast (050°-070°) and dip to the north (50°-65°) as seen in Figure 2. The southerly younging direction can be seen in selected meta-sedimentary units and is consistent with the beds being overturned. A well-developed down-dip lineation is pervasive across the property and can be seen in some units more easily than others. C-S fabrics in one particular unit in the west zone is typical of a dextral sense of movement on the gold-bearing shear zones, which is supported by small-scale veins that exhibit z-fold structures. A recent structural study of drill-hole maps and selected trenches (Park 2001) outlined the plunge of mineralized bodies as they now exist after experiencing two episodes of deformation with the first being predominantly strike-slip movement (dextral) prior to later dip slip

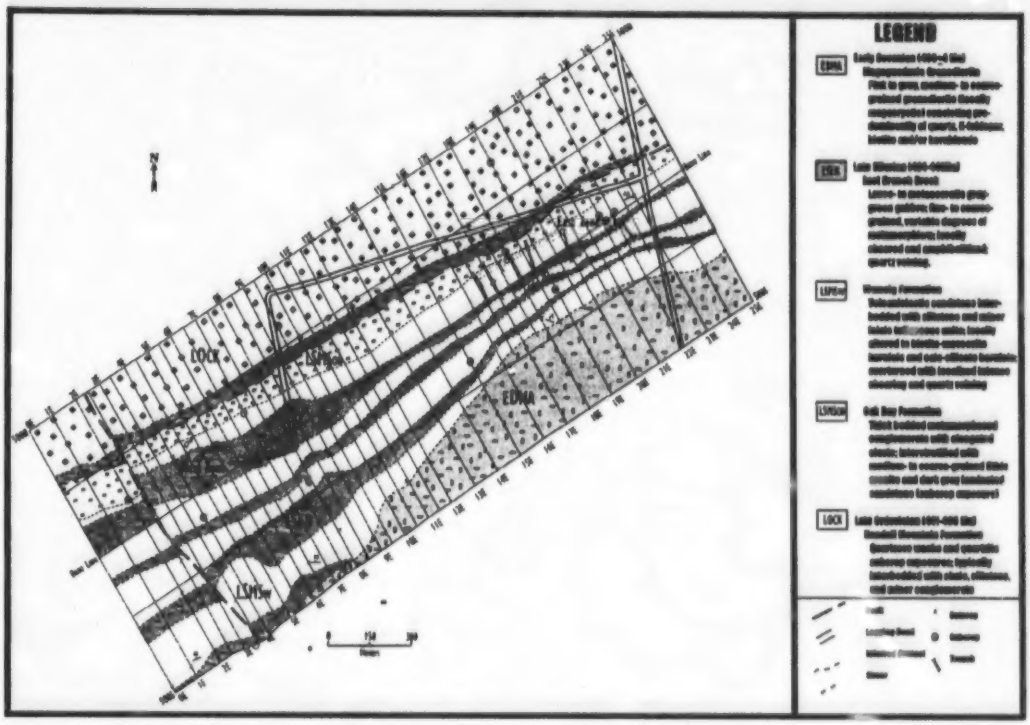

Figure 2. Local geology on the original grid portion of the Clarence Stream claim group.

movement, which is defined by the well-developed vertical lineation. A schematic diagram illustrating this deformation is shown in Figure 3. Microscopic kinematic features within oriented samples suggest the batholith portion of the property has been uplifted with respect to the country rocks to the north and may be responsible for the generation of this lineation (Park 2001).

Shearing of the units to variable degrees is widespread locally. In extreme cases where shearing is most intense, near-vertical quartz veins occupy the dilatant zones and may occasionally show signs of being boudinaged. The existence of small-scale boudins suggests that the larger gold-bearing veins have experienced similar episodes of deformation resulting in the observed pinching and swelling of the quartz veins along their lateral extent, although competency of the surrounding units may also play a major role in the size and orientation of the veins. These observations are important to understanding the timing and genesis of mineralization as they make it possible to assume that the veins (hence mineralization) predate the two proposed episodes of deformation (Park 2001).

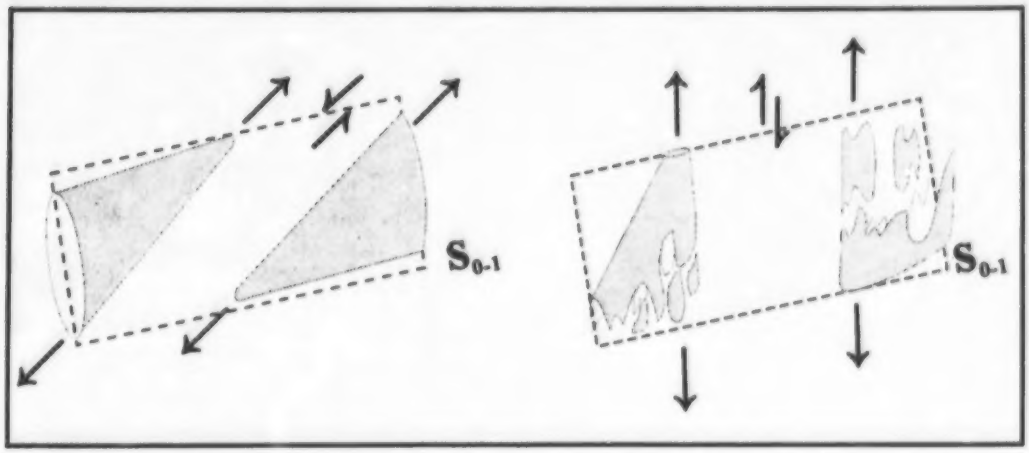

Figure 3. Schematic diagram illustrating the two episodes of deformation that affected the mineralized veins as proposed by Park (2001) with the arrows indicating the direction of elongation (modified from Park 2001).

The northeast-trending Sawyer Brook Fault that defines the base of the Silurian section (Fyffe *et al.* 1999) may cross-cut the property, although it is not exposed. This fault (or one of its splays) may have acted as a major conduit for focussing mineralizing fluids during ore deposition (possibly during local magmatic events) and would explain the parallel trend of the mineralized zones to the regional structure. A series of small-scale southeast-trending shears of lesser economic importance (i.e., unmineralized) have been observed to offset mineralized units up to a maximum of 4 m.

Lithologies

There are five main lithological units found within the grid area of the Clarence Stream property (see Fig. 2). They include the Waweig Formation, the Kendall Mountain Formation, the Magaguadavic Granodiorite, as well as the Oak Bay Formation and the newly introduced East Branch Brook metagabbros. The bulk of the mineralization is hosted within the metasedimentary units of the Waweig Formation and the East Branch Brook metagabbros (possible lateral equivalents of the Bocabec Gabbro). Two satellite plutons known as the Sorrel Ridge and Pleasant Ridge granites are situated to the northwest and north (respectively) of the original grid where they intrude Ordovician rocks. These Sn-W-Mo-Bi-bearing granites are two of several satellite plutons referred to collectively as the Pomeroy Intrusive Suite (Lentz *et al.* 1988; McLeod 1990), which have not been ruled out as having a possible role in the formation of this deposit. The reduced nature of these deep-seated stocks makes them prime candidates for possible intrusion-related gold systems (Thorne and Lentz 2001), although they have not previously been explored for their gold potential.

Kendall Mountain Formation (Ordovician)

As a member of the Ordovician Cookson Group (Fyffe *et al.* 1999), this unit typically consists of interbedded shale, siltstone, and minor conglomerate (McLeod *et al.* 1998) in addition to minor amounts of basalt (Fyffe and Fricker 1987). The presence of graptolites within slatey

units suggests an age of early Carodocian (Fyffe and Fricker 1987). This unit lies at the most northern boundary of the claim group and is represented by quartzose wacke and quartzite boulders that are locally derived. Milky white quartz veins are often seen to cross-cut these rocks, but rarely contain associated mineralization on the main grid. Minor outcroppings of this unit are also seen on the northern extension of the grid and are assumed to be the unit hosting the mineralization that is responsible for the rather large soil anomaly that has been recently delineated.

Oak Bay Formation (Silurian)

The Sawyer Brook Fault found at the base of this unit marks the lower contact of the Silurian section (Fyffe *et al.* 1999). This fault represents an unconformable contact that truncates various formations of the Cookson Group (Fyffe *et al.* 1999) as can be seen in Figure 2.

Elongated igneous and sedimentary clasts within a metamorphosed conglomerate are typical of this formation in addition to interbedded medium- to coarse-grained lithic arenite and dark gray laminated sandstone (Fyffe *et al.* 1999). Clasts within the conglomerate have been found to originate from the Mascarene-Nerepis Belt of Fyffe and Fricker (1987), which were deposited as a result of contemporaneous debris flows during extensional faulting (Fyffe *et al.* 1999).

Waweig Formation (Silurian)

An assemblage of Late Silurian brachiopods that are a typical shallow-water fauna, have been found within this formation (Fyffe and Fricker 1987), which has been divided into three members, namely the Campbell Point Member, the Sawyer Brook Member, and the Simpson Corner Member (Fyffe *et al.* 1999). A brief description of each is as follows:

(1) *Campbell Point Member*: consists of interstratified volcaniclastic and siliciclastic sedimentary and felsic volcanic rocks whose bedding and younging direction are to the southeast. It is further divided into five self-explanatory lithofacies that include bedded tuffaceous sandstone facies, chaotic tuffaceous sandstone facies, waterlain pyroclastic facies, medium- to thick-bedded sandstone facies, and thin-bedded mudstone facies (Fyffe *et al.* 1999).

(2) *Sawyer Brook Member*: include pyrite-bearing gray to black shales interbedded with dark grayish green mafic tuffs (Fyffe *et al.* 1999). These rocks are interpreted to be deposited during hemipelagic sedimentation by means of low-density turbidity currents throughout an extended period of diminishing felsic volcanic activity (Fyffe *et al.* 1999).

(3) *Simpson Corner Member*: light pinkish gray, fine-grained sandstone grading into dark gray laminated silty mudstone are the dominant siliciclastic sedimentary rocks in this unit (Fyffe *et al.* 1999). There are also minor volcanic rocks interstratified locally that consist of both mafic and felsic end-members. The conditions under which these beds were deposited is not well understood, although they are thought to be laid down in a deep-water environment (Fyffe *et al.* 1999).

The Clarence Stream deposit is most likely hosted within the Campbell Point Member of the Waweig Formation, although the distinction has not yet been made as to which particular lithofacies are present. Outcroppings of this unit reveals that these metasediments have been

overturned and have experienced a hornfelsing event. The initial theory is that they have been metamorphosed as a result of the intermediate intrusive activity to the south, although their metamorphism may also be attributed to the intrusion of the coexisting gabbroic units. Volcaniclastic sandstones interbedded with felsic tuffs are the predominant lithologies that comprise this member.

East Branch Brook Metagabbro (Silurian/Devonian)

Multiple intrusions of fine- to coarse-grained, melanocratic to leucocratic gabbros are evident by the presence of chilled margins. These bodies have suffered various degrees of deformation resulting from regional and (or) local stress regimes. Alteration (including biotitization, saussuritization, and amphibolitization) is variable and is most likely a function of proximity to shearing as well as relative age. Field relations suggest an earliest age of Late Silurian. The relationship between the gabbros and granodiorite has not yet been observed, although it is assumed that the gabbros are the older of the two units and that the pervasive biotite alteration is a result of high-temperature, hydrothermal alteration generated during the intrusion of the granodiorite.

Magaguadavic Granodiorite (Devonian)

As described by McLeod (1990), this unit consists of pink to gray, medium- to coarse-grained monzogranite; however, in the vicinity of the Clarence Stream property, granodiorite predominates. It is generally coarse-grained and is locally megacrystic and exhibits rapakivi texture. $^{40}Ar/^{39}Ar$ age dating of biotite within this unit returned an age of 400±4 Ma (McLeod 1990) that overlaps with a younger U-Pb (zircon) age of 396±1 Ma obtained by Bevier (1990). This megacrystic intrusion has of an I-type geochemical signature and contains biotite and (or) hornblende (McLeod 1990). Geochemical analyses indicate that this granite is post-collisional, while lead isotopic signatures suggest an upper crustal radiogenic source typical of Avalonian rocks (McLeod 1990). Numerous gold occurrences have been reported in the vicinity of the younger phase of the Magaguadavic Granodiorite in the eastern portion of the Saint George Batholith (McLeod and McCutcheon 2000) and is therefore assumed to be responsible for the majority of mineralization found at the Clarence Stream deposit.

Pleasant Ridge Stock (Devonian)

To the north of the Freewest claim block is the Pleasant Ridge stock, which has been described as a stock composed of porphyritic biotite granite (adamellite) and a muscovite granite (adamellite) (Butt 1976) that is peraluminous in character (Taylor 1992). Taylor (1992) classified this granite as a lithium-rich mica-topaz-bearing intrusion. Investigations have shown that this intrusion is more highly evolved and has Sr isotopic signatures that are indicative of minor assimilation of sedimentary crustal material (Butt 1976). The magma responsible for the generation of this pluton is interpreted to contain more water than those of the nearby Beech Hill and Sorrel Ridge stocks (Butt 1976) implying the potential for greater amounts of associated hydrothermal activity, which may contribute to the genesis of this deposit. A radiometric date of around 361 Ma ($^{40}Ar/^{39}Ar$ muscovite (McLeod 1990)) has been determined for this intrusion, similar to those of Mount Pleasant.

Sorrel Ridge Pluton (Devonian to Carboniferous)

The Sorrel Ridge granite is a porphyritic pluton that is classified as Late Devonian to Mississippian in age (McLeod *et al.* 1994) and currently underlies the northwest corner of the

Clarence Stream property. The development of a cordierite isograd has been observed in the Ordovician metasedimentary units found proximal to the intrusion (Fyffe 1997). Although outcroppings of this unit do not exist on the cut grids, it is exposed in various roadbeds that cross the pluton.

Mineralization

At the Clarence Stream gold deposit, arsenopyrite, pyrite, pyrrhotite, and stibnite in association with invisible and free gold characterize the sulphide assemblage of the ore-bearing zones. Ag, Bi, Cd, Te, Sb, S, As, and minor Cu (in decreasing order of abundance) were found to be anomalous in selected trench samples of quartz-rich and quartz-poor alteration assemblages, which others interpret as closely resembling the geochemical signature of intrusion-related gold deposits as described by Lang *et al.* (2000). Five different varieties of antimony minerals have been identified by Louis Cabri that include stibnite, aurostibite, berthierite, gudmundite, and native antimony (Freewest Resources Canada Incorporated, June 28 press release).

Two major zones of mineralization have been delineated on the property based on soil geochemistry and host rocks that are referred to as the West and East zones. A 1.5 km tract of underexplored ground buried beneath a thicker amount of overburden with clay separates the two zones. These zones have been tested during the drilling programs, which resulted in the delineation of a third zone immediately to the east of the West Zone and is referred to as the Central Zone, all of which are inferred to be related, although displaced due to faulting (northwest-trending wrench faults).

Quartz veins within the metagabbros and at their contacts with the hornfelsed metasediments are typical of the West Zone. The sulphide content varies in relation to the overall texture of the hosting quartz, which can be divided into four main types. The first variety contains free gold in association with minimal amounts of pyrite and sphalerite in massive, saccaroidal-textured white quartz that exists in veins that swell to a width of 3 m. It locally exhibits a light green hue produced by epidote lining the walls of fractures. Just 25 m to the east, a light gray, 1 m wide quartz vein exhibiting a crushed texture, contains massive sphalerite, arsenopyrite, and pyrrhotite with invisible gold and is offset approximately 4 m in a sinistral fashion by an unmineralized north-northwest-trending fault. This texture may be indicative of reworking caused by movement along the bounding shear zone subsequent to vein precipitation (emplacement). There are also barren-looking milky white quartz veins with sheared margins and chloritized gabbroic xenoliths that contain anomalous values of invisible gold and minor amounts of sulphides. Smaller veins, characterized by a red-orange weathered surface, have elevated gold abundances in channel samples where they cross-cut metasedimentary rafts within the gabbroic sills. Late irregular chlorite-rimmed fractures varying in size cross-cut the metagabbro bodies and are filled by white aggregates of prehnite.

The East Zone is characterized by boudinaged quartz veins that exist as chlorite-stained pods scattered throughout extremely sheared, fissile material in addition to less deformed, near-vertical quartz veins that have an orange-red weathered surface. The gray coloured quartz is stained red in places where tiny vugs are lined with earthy hematite and/or realgar and also exhibits local patches of yellow-green residue (scorodite). Invisible gold in abundant

proportions is found to be associated with these veins where the sulphide assemblage consists predominantly of arsenopyrite, stibnite, and specular hematite. Shearing of the silicified tuffaceous metasediments that are host to these veins is at an angle slightly oblique to local bedding and thus facilitating infiltrative fluid flow through the sequence enabling sulphide saturation (disseminations) associated with reaction. Slight folding and offsetting of these veins along small post mineralization north-northwest-trending shear zones.

Drilling and trenching programs executed by Freewest Resources Canada Incorporated are ongoing to further delineate existing mineralized zones, as well as to uncover additional areas that warrant future exploration activity.

STOP LOCATIONS AND DESCRIPTIONS

The stop locations for 1A, 1B and 2 can be seen in Figure 4. Figure 5 shows the location of stops 3, 4 and 5.

STOP 1A. Commencing at the western-most point of trench 1, a mylonitic felsic unit exhibits a C-S fabric (see Figure 5 below) and a small cataclasite (epidote-rich matrix) in the southwestern corner. The metagabbro units are highly strained and contain numerous cross-cutting, chlorite-rimmed prehnite veinlets that are randomly oriented and deformed to various degrees (strain gradient). Small en echelon quartz veins grade laterally eastward to an individual vein that swells to 3 m wide. It is located at the contact between the metasediments (Waweig Formation) and the metagabbros (East Branch Brook). This vein contains visible gold in addition to sphalerite, arsenopyrite, stibnite, and minor amounts of pyrite and chalcopyrite. A channel sample taken from the central portion of the vein ran 68.1 g/t Au over a 3 m interval while another cut taken across the 3 m portion of the vein ran 72.1 g/t Au.

Walk along small pathway (heading east) that joins the two trenches.

STOP 1B. There are at least two phases of gabbro in the eastern portion of trench 1 as seen by the chilled margin on the west end. The south end of the trench consists of relatively fresh gabbro, which is cut by a barren-looking white quartz vein. Grab samples from this vein ran up to 7 g/t Au. The fresh gabbro seems to be cut by a felsic volcanic unit (possibly a felsic dike or a felsic mylonite) and the presence of this unit seems to mark the boundary between the fresh gabbro and the altered gabbro. Quartz pods/veins containing variable amounts of sulphides are associated with the felsic volcanic unit and are more obvious in the eastern portion of the trench. The altered gabbro contains Au and abundant pyrrhotite, as well as Au-bearing quartz veins. A distinct fabric defining S_1 can be seen within the gabbro, particularly in areas proximal to major shearing and quartz vein development. To the north of the altered gabbro are the hornfelsed Silurian cordierite-biotite metasediments (Waweig Formation) and the main quartz vein in this trench occupies the boundary between the two units. This vein carries consistent Au values along its strike length of up to 23.7 g/t over 1 m. Other metallic minerals seen in the quartz vein include sphalerite, arsenopyrite, stibnite, pyrite, and pyrrhotite. The trench is cut by a post-mineralization, northwest-trending fault zone that displaces the units by 4.5 m in a sinistral fashion.

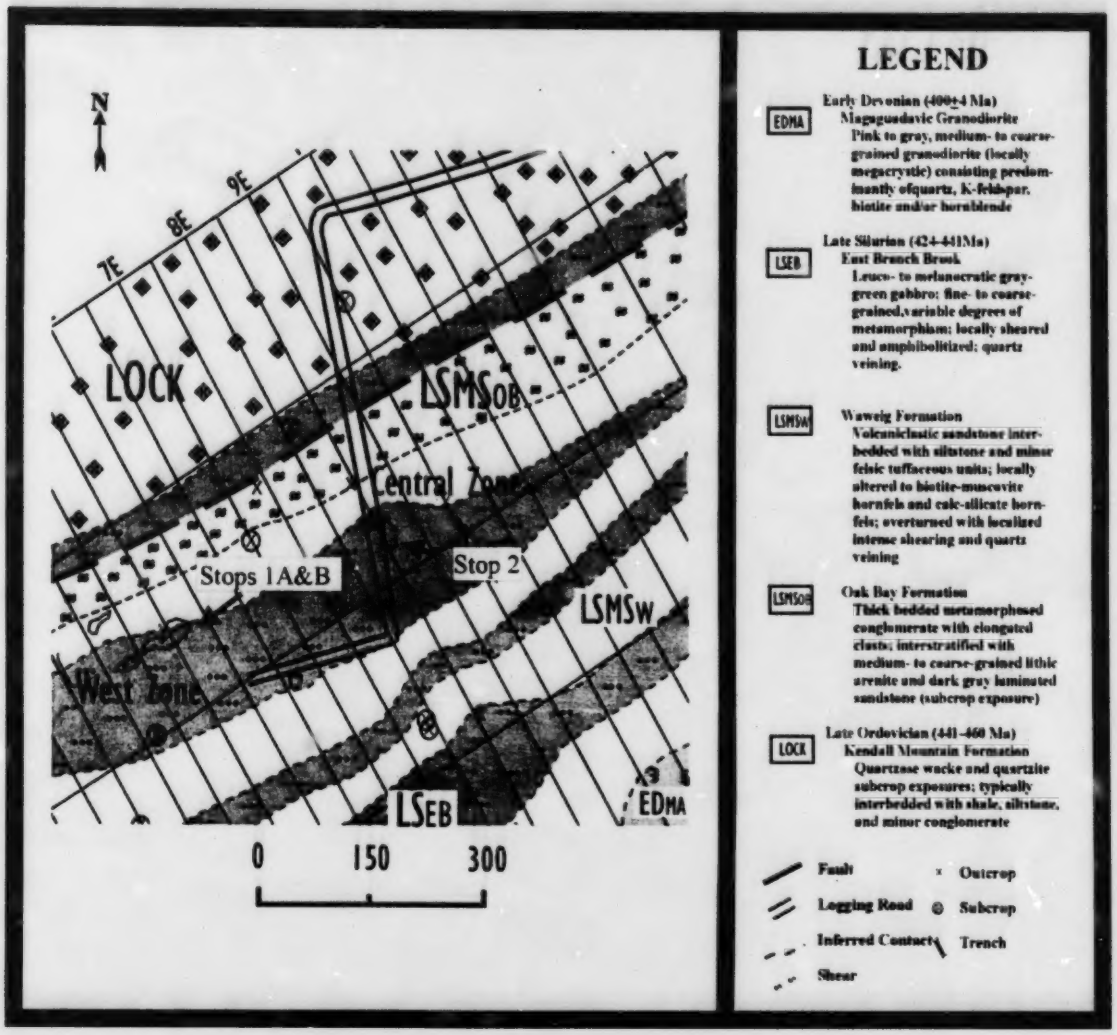

Figure 4. The geology of the West Zone illustrating the location of stops 1A and 1B as well as Stop 2.

STOP 2. Trench 2 shows more clearly the relationship between the gabbro and the metasediments, which allows for conclusions to be drawn concerning the large-scale structure of the gabbro bodies. The southern portion of the trench has sedimentary "rafts" within the gabbro whereas the gabbro is seen to discordantly cut across the metasediments in the southern portion of the trench. The contacts between the two units are generally difficult to ascertain. The reaction of the gabbro to differing degrees of strain can also be seen from one end of the trench to the other with fabric development being especially well-defined closest to the quartz veins and shear zones. A grab sample from the white quartz vein within the small shear zone contained 4.6 g/t Au while a grab sample of altered gabbro from the edge of the trench near the road ran 45.6 g/t Au. Channel sample T2-34 ran 3.99 g/t Au over 0.5 m.

STOP 3. Sheared fissile metasedimentary units, presumably belonging to the Waweig Formation, host the gold-bearing veins, pods, and boudins in trench 7. The fabrics have steep lineations and poorly developed structures, i.e., dismembered hinges plunging moderately eastward. Abundant stibnite, hematite, and arsenopyrite are the prominent minerals found in association with the gold and comprise the typical assemblage that defines the East Zone. Realgar is present on surface-oxidized samples. A grab sample taken from the eastern side of the trench ran 574.5 g/t Au whereas a grab sample taken from the central portion ran 71.75 g/t Au and one taken farther to the west ran 114.15 g/t Au. In the northern portion of this trench is a wide shear zone with boudinaged quartz veins scattered throughout the fissile material. This shear zone seems to mark the boundary between the finer units with the coarser lithologies to the north. It appears to be a prominent feature in this area and can be traced along strike for at least 400 m. Channel samples in this trench returned values of 25.1g/t Au over 3 m, 31.8 g/t Au over 3 m, 48.9 g/t over 3 m, and 20 g/t Au over 3 m (Hoy 2000).

STOP 4. Thin, interbedded fine-grained metasediments and medium- to coarse-grained metagabbros are intensely sheared, then crosscut by pegmatitic-aplite dikes at this location (trench 4), which are locally atenuated. The texture of granitic dikes varies from aplitic to granophyric to pegmatitic in places. Anomalous gold values are obtained within these dikes and are thus far the best indication of an intrusion-related origin to gold mineralization. The presence of these dikes in this trench is most likely a function of the close proximity of the Magaguadavic Granodiorite to the south of this location. Smaller-scale pegmatite dikelets are present in the eastern part of the trench and appear to be boudinaged parallel to the main foliation. These small dikes are being tested geochemically to determine possible genetic links with the surrounding intrusions. Take note of the boudinaged beds in the eastern portion of the trench, which give an indication of their degree of deformation. These beds have been cut asymmetrically and then have been transposed parallel to the main foliation indicating that this area is highly strained (Park 2001). Sample T4-16 ran 9.11 g/t Au while T4-13 and T4-14 ran 6.44 g/t and 3.01 g/t Au, respectively.

STOP 5. This boulder of Magaguadavic Granodiorite exhibits a number of features that are characteristic of this intermediate intrusion. It ranges in colour from light gray to light pink on the weathered surface while the fresh surface can vary quite drastically depending on the amount of mafic minerals present. The predominant mineral assemblage consists of K-feldspar, quartz, biotite, muscovite and hornblende. The mafic content of this unit is variable (ranging from 8 to 10%; McLeod 1990) depending on the amount of wall rock assimilation. Rapakivi texture can be seen in the potassic feldspar crystals as they are rimmed by white sodic plagioclase. Aplite dikes of unknown origin (or age) are seen to crosscut the Magaguadavic Granodiorite.

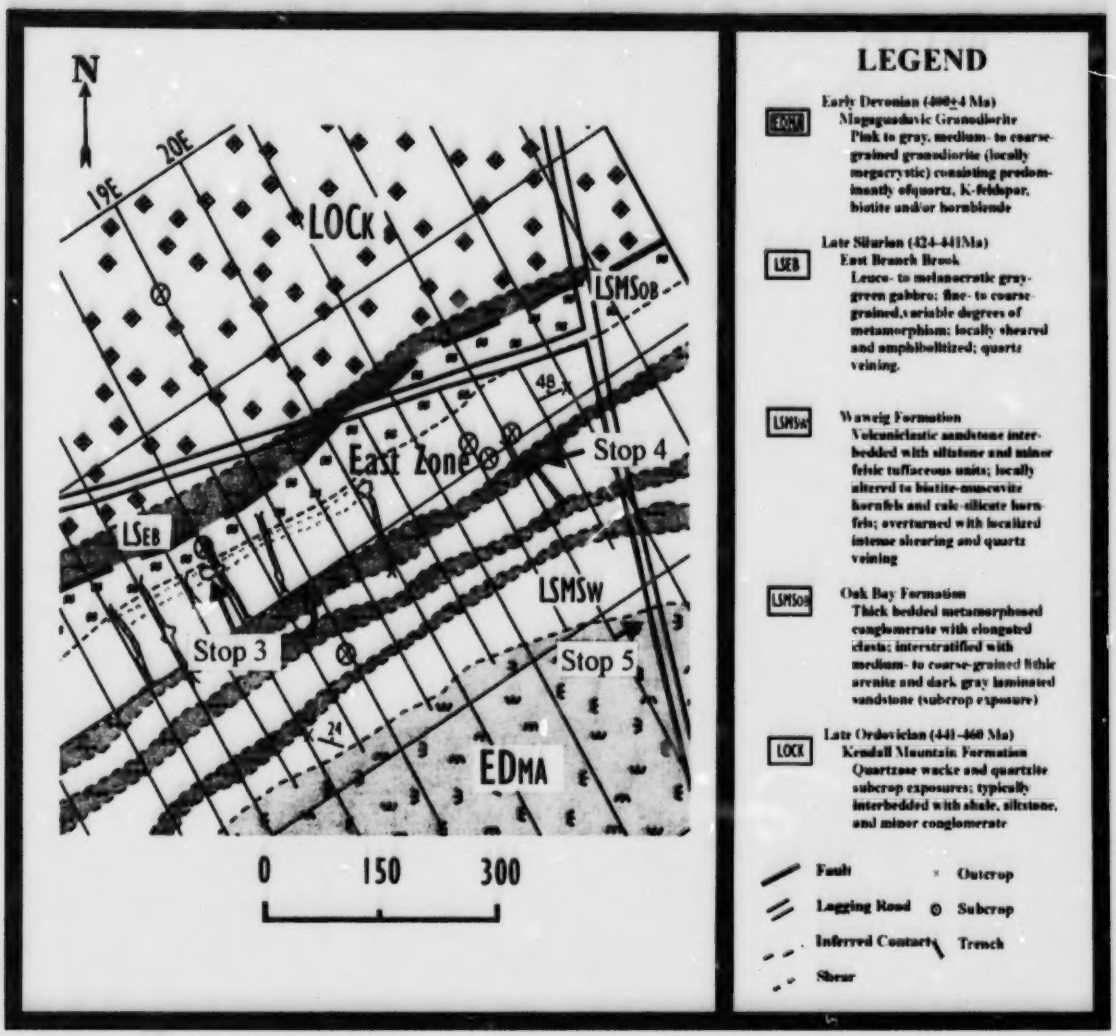

Figure 5. The geology of the East Zone with the locations for stops 3, 4 and 5.

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